CHAPTER 02

Introduction to MySQL and SQL

In this Chapter...

- MySQL
- Structured Query Language (SQL)
- SQL Commands
- Data Types

MySQL

Most organizations track different types of information, like; information about their employees, clients, projects and any other terms, which support or which might support their programs and services. Managing this information is crucial.

A DBMS (Database Management System) allows the user to manage and use a vast variety of information easily. DBMS also provides a centralized control of its operational data.

DBMS is easy to set-up, easy to manipulate and easy to use. There are many DBMSs available in the market such as MySQL, INGRES, POSTGRES, DB2, Oracle, etc, among them MySQL is very popular database management system.

MySQL is an open source Relational Database Management System(RDBMS) based on SQL(Structured Query Language).

In MySQL database, information is stored in tables and runs virtually on all platforms including Linux, Unix and Windows.

MySQL provides many features such as storing, maintaining and controlling data in a secured environment. It is a fast, reliable, scalable substitute to many of the commercial RDBMSs available today. MySQL works with many languages like PHP, Perl, C, C++, Java etc.

History of MySQL

MySQL was introduced by a software company MySQL AB, founded by **David Axmark**, **Allan Larsson** and **Michael Widenius** in the year 1994 in Sweden. Sun Microsystems (a well known ZJava development company) acquired MySQL AB on 26-February-2008. MySQL was first released on 23-May-1995, for personal usage based on ISAM (Indexed Sequential Access Method).

It supports the basic principles of database and data manipulation used to retrieve, insert and update stored data. Being an open source anyone can use and change the software for their needs.

It supports the basic principles of database and data manipulation using SQL statements.

MySQL 8.0.16 was the latest version of MySQL and it is available free of cost on Internet.

Some of the MySQL versions are as follows

Versions	Released Date
MySQL 3.20.0	May 1997
MySQL 3.23.0	August 1999
MySQL 3.23.32	January 2001
MySQL 4.1	October 2004
MySQL 5.0	October 2005
MySQL 5.1	November 2008
MySQL 5.5	December 2010
MySQL 5.6	February 2013
MySQL 8.0.16	April 2018

Components of MySQL

A database is a structured collection of data, the vast amount of information. To add, access, and process data stored in a computer database, you need a database management system such as MySQL server.

Information system is the key role of database management system and database server is the key to solve the problems of information management.

MySQL can be used for variety of applications but it is mostly used for the web applications on the Internet.

MySQL database system consists of the following three components

Server (MySQL server)

MySQL server is an engine which provides access to databases, responsible for creating, managing database, executing and returning queries and maintaining security together with additional tools to manage multiple MySQL servers.

Clients

A client is a program that connects to the database server and issue queries in a pre-specified format. In MySQL, you can enter command-line queries to manage user permissions and utilities to import and export MySQL database.

Client Library

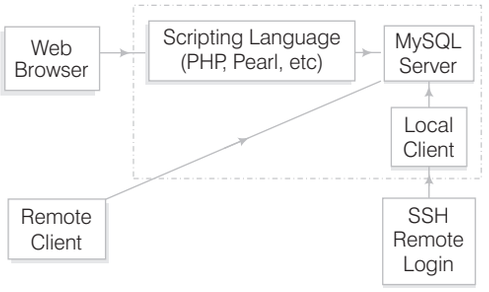
A client library is an Application Programming Interface (API) where a client can write their own programs using a programming language like C, C++, Java, etc.

Working of MySQL

MySQL database works on client/server architecture. It is installed on a server (i.e. single machine), but it can provide the database facility to a variety of clients at different locations.

MySQL server can be accessed directly *via* various client interfaces, which send SQL statements to the server and then display the results to the user.

The following figure shows the working of MySQL server



(i) **Local Client** It is a program on the same machine as the server. *For example*, Command Line MySQL client software.

(ii) **Scripting Language** It can pass SQL queries to the server and display the result.

For example, PHP, Perl, Python, etc.

(iii) **Remote Client** It is a program on different machine that can be connected to the server and display the result.

(iv) **Remote Login** It allows connecting to the server machine to run one of its local clients.

(v) **Web Browser** We can use a web browser and scipts that someone has written.

Features of MySQL

MySQL is one of the top most database available in the market today. It is a relational database with many advanced features and options.

Some of the key features of MySQL are given below

Speed

MySQL is a very fast and reliable database program that supports clump servers for several demanding application programs.

The speed of MySQL has been backed up by a large number of benchmark tests.

Open Source

It is an open source database system which means anyone can use it without any cost.

One of the most benefit of MySQL includes its wide availability in the market with no ownership cost. MySQL is quite customizable due to the fact that developers can alter its code in order to satisfy their needs.

Ease to Use

MySQL is a high performance but relatively simple database system and is less complex to setup or examine than larger database systems.

Query Language Support

ANSI (American National Standard Institute) standard SQL is an easy language to use because of its straight forward and simple syntax. MySQL supports standard based SQL (Structured Query Language) for querying and managing relational databases.

Security

MySQL is secured as all its access passwords are stored in an encrypted format restricting any unauthorized access to the system.

It also encrypts the transactions so eavesdroppers and data maintenance tools cannot replicate or regenerate the database transactions once they are processed.

Cross Platform Portability

MySQL is easily installable and operable on different platforms including Linux, Windows, OS2, Solaris etc. It also contains APIs for integration with various programming languages like C, C++, PHP, Java, Perl, Python and Ruby etc.

Licensing

MySQL works under the GPL (General Public License) i.e., the users can enjoy the opportunity at free of cost.

Connectivity

MySQL is a relational client/server database system. There is a database server (MySQL) and arbitrarily many clients (application programs), which communicate with the server using several protocols i.e., they query data, save changes etc.

Structured Query Language (SQL)

SQL is used by all programs and users to access data within the MySQL database. There is a structure to this language, it uses english phrases to define an action, but uses math-like symbols to make comparisons.

For example,

```
SELECT * FROM Table;
```

SQL was initially developed at IBM by **Donald D. Chamberlin** and **Raymond F. Boyce** in the early 1970s.

This version initially called SEQUEL (Structured English Query Language), was designed to manipulate and retrieve data stored in IBM's original RDBMS.

In the late 1970s, Oracle Corporation saw the potential of the concepts described by codd, Chamberlin and Boyce and developed their own SQL-based RDBMS with aspirations of selling it to the various U.S. government agencies.

In June 1979, Oracle Corporation introduced the first commercially available implementation of SQL, Oracle V2 for VAX computers. The American National Standards Institute (ANSI) adopted SQL as the standard language for RDBMSs in 1986.

The International Standards Organization (ISO) has also adopted SQL as the standard language for RDBMSs.

Characteristics of SQL

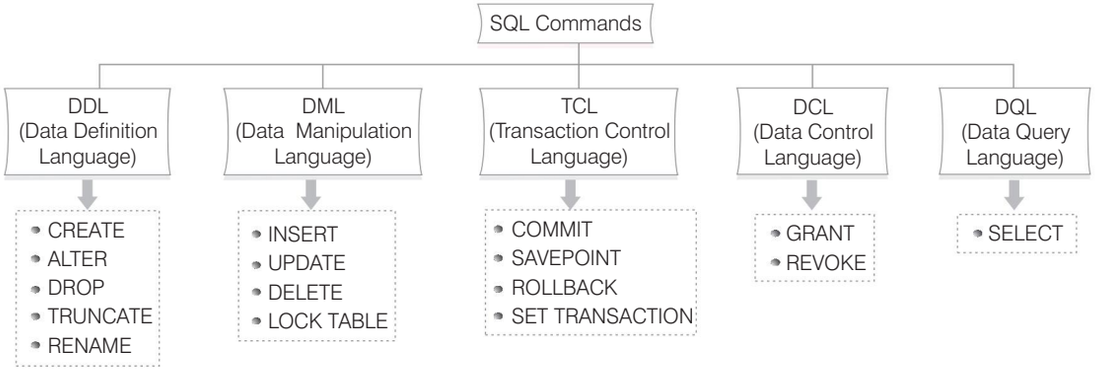
Main characteristics of SQL are given below

- SQL is an ANSI and ISO standard computer language for creating and manipulating databases.
- SQL allows the user to create, update, delete and retrieve data from a database.
- SQL is very simple and easy to learn.
- SQL is used specifically for relational databases.
- SQL works with database programs like DB2, Oracle, MS-Access, Sybase Microsoft SQL Server, etc.

SQL Commands

In order to access data from MySQL database, all applications, programmers and users must use Structured Query Language (SQL). SQL commands are the instructions used to communicate with the database to perform specific task that work with data. SQL commands can be used not only for searching the database but also to perform various other functions like, create tables, add data to tables, modify data, drop the table, set permissions for users and many more.

SQL commands can be classified into following categories



Data Definition Language (DDL)

DDL is used to define the structure of your tables and other objects in the database. In DBMS, it is used to specify a database schema as a set of definitions (expressed in DDL), In SQL, DDL allows you to create, alter and destroy database objects.

Basically, a data definition language is a computer language used to create and modify the structure of database objects in a database. These database objects include views, schemas, tables, indexes, etc.

This term is also known as **data description language** in some contexts, as it describes the fields and records in a database table.

Data definition language consists of various commands that lets you to perform some specified tasks as follows

(i) **CREATE** Used to create objects in the database.

(ii) **ALTER** Used to alter the structure of the database table. This command can add up additional column, drop existing columns and even change the data type of columns involved in a database table.

(iii) **DROP** Used to delete objects from the database.

(iv) **TRUNCATE** Used to remove all records from a table.

(v) **RENAME** Used to rename an object.

Data Manipulation Language (DML)

DML provides various commands used to access and manipulate data in existing database. This manipulation involves inserting data into database tables, retrieving existing data, deleting data from existing tables and modifying existing data. DML is mostly incorporated in SQL database. The basic goal of DML is to provide efficient human interaction with the system.

The DMLs are of two types

Procedural DMLs These require a user to specify what data is needed and how to get it.

Non-Procedural DMLs These require a user to specify what data is needed without specifying how to get it.

Various data manipulation language commands are as follows

(i) **INSERT** Used to insert data into a table.

(ii) **UPDATE** Used to update existing data within a table.

(iii) **DELETE** Used to delete all records from a table, the space of the records remains.

(iv) **LOCK TABLE** Used to control concurrency.

Differences between DDL and DML

DDL	DML
DDL is the abbreviation of Data Definition Language.	DML is the abbreviation of Data Manipulation Language.
It is used to create and modify the structure of database objects in database.	It is used to retrieve, store, modify, delete, insert and update data in database.
DDL commands allow us to perform tasks related to data definition.	DML commands are used to manipulate data.
For example, CREATE, ALTER, and DROP commands.	*For example*, SELECT, UPDATE, and INSERT commands.

Transaction Control Language (TCL)

TCL is playing an important role in SQL. TCL commands are used to manage transactions in database. These are also used to manage the changes made by DML statements. It allows statements to be grouped together into logical transactions. A transactions is a single unit of work.

Each individual statement is a transaction. If a transaction is successful, all of the data modifications made during the transaction are committed and became a permanent part of the database. If a transaction encounters an error and must be cancelled or rolled back, then all of the data modifications are erased. To manage all these operations, transaction control language commands are used.

Various transaction control statements are as follows

(i) **COMMIT** Used to save the work done.

(ii) **SAVEPOINT** Used to identify a point in a transaction to which you can later rollback.

(iii) **ROLLBACK** Used to restore database to original since the last COMMIT.

(iv) **SET TRANSACTION** It establishes properties for the current transactions.

Data Control Language (DCL)

DCL commands are used to assign security levels in database which involves multiple user setups.

They are used to grant defined role and access privilages to the users.

There are two kinds of user in the schema

Users They work with the data, but cannot change the structure of the schema. They write data manipulation language.

Admin They can change the structure of the schema and control access to the schema objects. They write data definition language.

Basically, the DCL command of the SQL language is used to create privileges to allow users access to and manipulation of the database. Two types of DCL commands are

(i) **GRANT** Used to give user's access privileges to database.

(ii) **REVOKE** Used to withdraw access privileges given with the GRANT command.

Data Query Language (DQL)

DQL is used to fetch the data from the database. It uses only one command **SELECT**. This command helps you to select the attribute based on the condition described by the WHERE clause.

Creating a Database

Creating a database is an easier task. You need to just type the name of the database in a **CREATE DATABASE** command.

Syntax

```
CREATE DATABASE [IF NOT EXISTS]<database _name>;
```

CREATE DATABASE command will create an empty database with the specified name and would not contain any table.

IF NOT EXISTS is an optional part of this statement which prevents you from an error if there exists a database with the given name in the database catalog.

For example, `mysql>CREATE DATABASE BOOK;`

Output Query OK, 1 row affected <0.01 sec>

Select a Database

Creating a database is not enough for use. Before working with tables, first you have to select the database. The only thing need to be considered before selecting a database is that it must already exist. To select a database **USE** command is used.

Syntax `USE <database_name>;`

For example, `mysql>USE ENGBOOK;`

where, **USE** command makes the specified database as a current working database and **ENGBOOK** is the database name.

Output Database changed

Creating a Table

Database is a collection of tables. The main purpose for creating tables is to store information in an orderly fashion. Each database table consists of columns and rows-just like a graphical table.

The columns specify what data is going to be stored, while the rows contain the actual data. Tables are created using CREATE TABLE command.

Syntax

```
CREATE TABLE table_name
(
    column_name1 data_type(size),
    column_name2 data_type(size),
     ⋮
);
```

Here,

CREATE TABLE defines a new table.

table_name defines the name of a table.

column_name defines the name of a column.

data_type specify that which type of data can be contained in a particular column.

For example,

```
mysql > CREATE TABLE STUDENT
(
Student_Code INTEGER(5),
Student_Name CHAR(20),
Sex CHAR(1),
Grade CHAR(2),
Total_Marks DECIMAL
);
```

Output

Query OK, 0 rows affected <0.06 sec>

Displaying the Table Structure

DESCRIBE or DESC command is used to verify the structure of a table that you have created.

This command display the column names, available data items with their data types.

Syntax

```
DESCRIBE <table_name>;
```

or

```
DESC <table_name>;
```

For example,

```
mysql>DESC STUDENT;
```

Output

```
+-------------+-----------+----+---+-------+-----+
| Field       | Type      | Null | Key | Default | Extra |
+-------------+-----------+----+---+-------+-----+
| Student_Code | INTEGER(5) | NO | PRI |       |       |
| Student_Name | CHAR(20)   | YES | MARY |      |       |
| Sex          | CHAR(1)    | YES |      |      |       |
| Grade        | CHAR(2)    | YES |      |      |       |
| Total_Marks  | DECIMAL    | YES |      |      |       |
+-------------+-----------+----+---+-------+-----+
5 rows in set (0.08 sec)
```

Data Types

A data type is a data storage format that can contain a specific type or range of values. The fields within a database often require a specific type of data to be input.

For example, a school's record for a student may use a character data type for the students first and last name.

The student's date of admission and date of birth would be stored in a date format, while his or her marks in each subject may be stored as a numeric.

Some mainly used data types in MySQL are as follows

(i) Numeric data type

(ii) String or Text data type

(iii) Date and time data type

Numeric Data Type

It allows the database server to store numbers such as integers and real numbers in a column.

For example, age of the students, numbers obtained in subjects etc.

Types	Length in Bytes	Minimum **Value** (Signed)	Maximum **Value** (Signed)	Minimum **Value** (Unsigned)	Maximum **Value** (Unsigned)
TINYINT	1	-128	127	0	255
SMALLINT	2	-32768	32767	0	65535
MEDIUMINT	3	-8388608	8388607	0	16777215
INT	4	-2147483648	2147483647	0	4294967295
BIGINT	8	-9223372036854775808	9223372036854775807	0	18446744073709551615

FLOAT (N,D) A small number with floating decimal point. It cannot be unsigned. It's size is 4 bytes. Here, N represents the total number of digits (including decimals) and D represents the number of decimals.

DOUBLE (N,D) A large number with floating decimal point. It cannot be unsigned. It's size is 8 bytes. Here, N represents the total number of digits and D represents the number of decimals.

DECIMAL (N,D) An unpacked floating point number that cannot be unsigned. In decimal, each decimal number corresponds to one byte. Here, N is the total number of digits and D is the number of decimals.

String/Text Data Type

It allows the database server to store string values such as Name of the students, Address etc.

Types	Description	Display Format	Range in characters
CHAR	Contains non-binary strings. Length is fixed as you declare while creating a table. When stored, they are right-padded with spaces to the specified length.	Trailing spaces are removed.	The length can be any value from 0 to 255.
VARCHAR	Contains non-binary strings. Columns are variable length strings.	As stored.	A value from 0 to 255 before MySQL 5.0.3, and 0 to 65,535 in 5.0.3 and later versions.

Date and Time Data Type

It allows the database server to store a date using the fields YEAR, MONTH and DAY in the format YYYY-MM-DD.

For example, Date of admission, Date of birth etc.

Types	Description	Display Format	Range
TIME	Use when you need only time information	HH:MM:SS	–838:59:59 to 838:59:59
DATETIME	Use when you need values containing both date and time information.	YYYY-MM-DD HH:MM:SS	'1000-01-01 00:00:00' to '9999-12-31 23:59:59'
DATE	Use when you need only date information.	YYYY-MM-DD	'1000-01-01' to '9999-12-31'
TIMESTAMP	Values are converted from the current time zone to UTC (Co-ordinated Universal Time), while storing and converted back from UTC to the current time zone when retrieved.	YYYY-MM-DD HH:MM:SS	'1970-01-01 00:00:01' UTC to '2038-01-19 03:14:07' UTC
YEAR	The year type is a 1-byte type used to represent year values. It can be declared as year (2) or year (4) to specify a display width of two or four characters. If no width is given, the default is 4 characters.	4444	1901 to 2155

Chapter Practice

PART 1
Objective Questions

• Multiple Choice Questions

1. SQL stands for
(a) Standard Queue Language
(b) Standard Query Language
(c) Structured Query Language
(d) None of the above

Ans. (*c*) SQL stands for Structured Query Language . It is used to perform different operations with databases and the data held in tables. It can perform operations like search, delete , update etc.

2. The command CREATE belongs to
(a) DDL (b) DML
(c) TCL (d) DCL

Ans. (*a*) The CREATE command belongs to DDL category.

3. MySQL is a
(a) open source software
(b) proprietary software
(c) shareware
(d) None of the above

Ans. (*a*) MySQL is a free and open source software.

4. There are …… categories of SQL commands.
(a) 2 (b) 3
(c) 1 (d) 4

Ans. (*d*) SQL commands are divided into 4 categories : DDL , DML , TCL and DCL.

5. The command used to remove objects from a database is
(a) DELETE (b) DROP
(c) REMOVE (d) CLEAR

Ans. (*b*) The DROP command used to remove objects completely from a database.

6. In MySQL, commands can be written in
(a) uppercase (b) lowercase
(c) title case (d) any case

Ans. (*d*) In MySQL, commands are not case- sensitive , hence commands can be written in any case.

7. The command to modify data in SQL
(a) ALTER (b) UPDATE
(c) CREATE (d) None of these

Ans. (*b*) The UPDATE command is used in SQL to make changes to the data of a table.

8. Which of the following is not a feature of MySQL?
(a) Cross platform
(b) User friendly
(c) Open source
(d) License fee is to be paid for use

Ans. (*d*) MySQL does not need any license fee to be paid for use.

9. A …… declares that an index in one table is related to that in another table. **(NCERT)**
(a) foreign key (b) composite key
(c) secondary key (d) primary key

Ans. (*a*) A foreign key is a linking column in two tables that indicates the relation between the two tables.

10. Given the table Student **(NCERT)**

RollNumber	SName	DateofBirth	Guid
1	Atharv Ahuja	2003-05-15	444444444444
3	Taleem Shah	2002-02-28	101010101010
4	John Dsouza	2003-08-18	333333333333
5	Ali Shah	2003-07-05	101010101010
6	Manika Pal	2002-03-10	466444444666

What is the degree of the table?
(a) 2 (b) 1
(c) 3 (d) 4

Ans. (*d*) Degree is the number of columns in a table . The Student table contains 4 columns, so degree is 4.

• Case Based MCQs

Direction *Read the case and answer the following questions.*

11. Mr. Subramaniyam is new to databases and its formation, using softwares . He is confused between certain terms related to database management softwares and the SQL commands used in them. Help him in understanding the concepts.

(i) Which of the following are not DBMS?
(a) MySQL (b) Adobe Reader
(c) Oracle (d) DB/2

(ii) RDBMS stands for
(a) Real Database Making Software
(b) Reading and Database Making Software
(c) Relational Database Management System
(d) Real Database Making Structure

(iii) DML commands help to
(a) add records
(b) remove a table
(c) create a database
(d) remove a database

(iv) He wanted to know the command to be used to delete the records of a table, the command is
(a) REMOVE (b) ADD
(c) DELETE (d) DROP

(v) He wanted to create a table Sports where he wanted to have SportsID as the primary key. Can he insert two SportIDs with same value ? **(NCERT)**
(a) Yes
(b) No
(c) Yes, if SportsID is foreign key
(d) Yes , if SportsID does not store numbers

Ans. (i) (*b*) Adobe reader is a software that helps to create platform independent document files.
(ii) (*a*) DML or Data Manipulation Language commands help to add, modify , delete and view records of a table.
(iii) (*c*) RDBMS stands for Relational Database Management System.
(iv) (*c*) The command is DELETE that delete records of a table.
(v) (*b*) Primary keys cannot have duplicate values.

12. Mrs. Rama wants to create two tables Employee and Work storing details of employees and their work locations as follows

Table : Employee

EmpId	EmpName	Dept	LocationID
1	Mrs. Aritri	Accts	L1
2	Mr. Rai	Sales	L2
3	Ms. Sunetra	IT	L3
4	Mr. Jacob	Accts	L2
5	Mr. Subir	IT	L3

Table : Work

LocationID	Location	Type
L1	Switzerland	Abroad
L2	Bangalore	Country
L3	Kolkata	Country

(i) Which column links the two tables?
(a) LocationID (b) Type
(c) EmpName (d) EmpId

(ii) Which column can be the primary key of the Employee table? **(NCERT)**
(a) EmpName (b) Dept
(c) EmpId (d) LocationID

(iii) What command she can use to create the tables?
(a) ALTER (b) CREATE
(c) APPEND (d) None of these

(iv) Which column can be the primary key of the Work table ? **(NCERT)**
(a) LocationID
(b) Location
(c) Type
(d) Primary key is not required

(v) If she wants to add a column to the table , the command that she would use , will be of which category ?
(a) DDL (b) TCL
(c) DML (d) DCL

Ans. (i) (*a*) The locationID is the column that common in both the tables and can be used to link both the tables.
(ii) (*c*) Primary key must be unique and carry not null values. It should be capable of identifying the records uniquely. Hence, EmpId can be the primary key.
(iii) (*b*) The CREATE is a DDL command that creates a table.
(iv) (*a*) The LocationID is the column that can uniquely identify the records of the Work table, hence it qualifies for being the primary key.
(v) (*a*) DDL or Data Definition Language commands are those that help to define database objects and their schema.

PART 2
Subjective Questions

• Short Answer Type Questions

1. Can a foreign key column be removed? What will happen if such a column is removed?

Ans. Yes, a foreign key column can be removed.
When a referenced foreign key is deleted or updated, respectively, the columns of all rows referencing that key will be set to NULL. The column must allow NULL or this update will fail.
You can delete a foreign key constraint in SQL Server by using SQL Server Management Studio or Transact-SQL. Deleting a foreign key constraint removes the requirement to enforce referential integrity.

2. What are the different categories of SQL commands?

Ans. The SQL command categories are

(i) **DDL** Data Defination Language

(ii) **DML** Data Manipulation Language

(iii) **TCL** Transaction Control Language

(iv) **DCL** Data Control Language

3. Name few other softwares that belong to the same category as MySQL.

Ans. MySQL is a database management software . Other softwares that belong to the same category are Oracle, MS-Access , DB/2 , Microsoft SQL Server, etc.

4. Describe the terms

(i) Domain (ii) DB2

Ans. (i) **Domain** It is a set of possible values for an attribute. A domain is said to be atomic if elements of the domain are considered as indivisible units.

(ii) **DB2** It is a Relational Database Management System (RDBMS), fully-featured, high performance database capable of handling large quantities of data and concurrently serving many users.

5. Write one difference between data and information.

Ans. Data is raw, unorganised facts that need to be processed. Data can be something simple and random. It is useless until it is organised. *For example*, each student's test score is one piece of data. When data is processed, organised, structured or presented in a given context so as to make it useful, it is called information.

6. What are the integer data types in MySQL?

Ans. MySQL supports the following integer data types

(i) TINYINT

(ii) SMALLINT

(iii) MEDIUMINT

(iv) INT

(v) BIGINT

7. State and explain the command that opens a database for working.

Ans. The USE command opens a database for working in it. A database must be opened using the USE command before anything can be done on its components. It belongs to DDL category.

8. What the float data type variations available in MySQL?

Ans. The float data type variations are

(i) **DOUBLE** (N,D) A large number with floating decimal point. It cannot be unsigned. It's size is 8 bytes. Here, N represents the total number of digits and D represents the number of decimals.

(ii) **DECIMAL** (N,D) An unpacked floating point number that cannot be unsigned. In decimal, each decimal number corresponds to one byte. Here, N is the total number of digits and D is the number of decimals.

9. In a sports academy there are two tables to store data

Sport(Sport_ID, SportName,Charges)

Sportsman(SP_ID,Sport_ID,SP_Name,Address)

(i) Is it correct to assign Sport_ID as the primary key in the Sport relation? If no, then suggest an appropriate primary key.

(ii) Is it correct to assign SP_ID as the primary key in the Sportsman relation? If no, then suggest appropriate primary key.

Ans. (i) Yes, it is correct to assign Sport_ID as primary key as it will contain unique and not null values and it can be used for identifying the records.

(ii) Yes, it is correct to assign SP_ID as primary key as it will contain unique and not null values and it can be used for identifying the records.

10. An organisation wants to create a database STAFFDB to maintain following details about its employees and their families. **(NCERT)**

Staff(Aadhar, SName, Location , Dept, StaffID)

Family(StaffID, DependentName, Relation)

(i) The attributes of STAFF, which can be used as candidate keys.

(ii) The company wants to retrieve details of dependent of a particular staff. Name the tables and the key which are required to retrieve this detail.

Ans. (i) **Candidate Keys** Aadhar, StaffID

(ii) **Tables required** Staff , Family

Key StaffID

11. Distinguish between UPDATE and ALTER commands.

Ans. Differences between UPDATE and ALTER Commands are as follows

UPDATE	**ALTER**
Belongs to DML category.	Belongs to DDL category.
Modified data of a table.	Modifies structure of the table .
Data can be modified with new data or expressions.	Columns can be added, modified , removed and renamed.

12. Explain the DML commands.

Ans. There are some DML commands are

(i) **SELECT** Used to retrieve data from a database.

(ii) **INSERT** Used to insert data into a table.

(iii) **UPDATE** Used to update existing data within a table.

(iv) **DELETE** Used to delete all records from a table, the space of the records remains.

13. Write the important characteristics of SQL.

Ans. There are some important characteristics of SQL are

(i) SQL is used specificially for relational databases.

(ii) SQL statements end with a semicolon (;).

(iii) SQL is an ANSI and ISO standard computer language for creating and manipulating databases.

(iv) SQL allows the user to create, update, delete and retrieve data from a database.

(v) SQL is very simple and easy to learn.

14. Differentiate DELETE and DROP commands of SQL.

Ans. Differences between DELETE and DROP cammands are

DELETE	DROP
Belongs to DML category.	Belongs to DDL category.
Used to remove records from a table.	Used to remove database objects like tables and databases.
Works with components of a table.	Works with entire database objects.

15. Differentiate between COMMIT and ROLLBACK command.

Ans. COMMIT command is used to permanent all the changes made by DML commands, while ROLLBACK means that it undoes all changes since the beginning of a transaction or since a save point.

16. What are DDL and DML?

Ans. **DDL (Data Definition Language)** is a part of SQL, which provides commands for creating, altering and dropping the tables. Different DDL commands are CREATE, ALTER, DROP and RENAME.

DML (Data Manipulation Language) is a part of SQL, which provides commands for inserting, deleting and updating the information in a database. Different DML commands are SELECT, UPDATE, INSERT.

• Long Answer Type Questions

17. Explain the major components of a database system.

Ans. The major components of a database system are

Hardware, Software, Data, Database Access Language, Procedures and Users all together form the components of a DBMS.

Let us discuss the components one by one clearly.

Hardware The hardware is the actual computer system used for keeping and accessing the database. The conventional DBMS hardware consists of secondary storage devices such as hard disks. Databases run on the range of machines from micro computers to mainframes.

Software Software is the actual DBMS between the physical database and the users of the system. All the requests from the user for accessing the database are handled by DBMS.

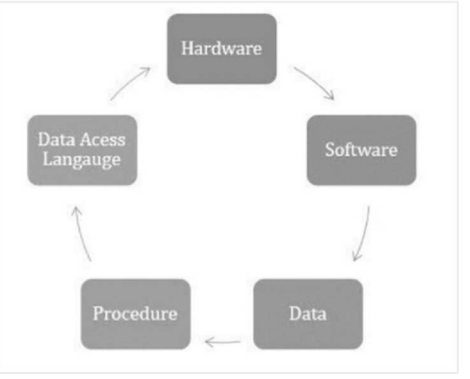
Data It is an important component of the database management system. The main task of DBMS is to process the data. Databases are used to store the data, retrieved and updated to and from the databases.

Users There are a number of users who can access or retrieve the data on demand using the application and the interfaces provided by the DBMS.

The users of the database can be classified into different groups

- Native Users
- Online Users
- Sophisticated Users
- Specialized Users
- Application Users
- DBA- Database Administrator

The components of DBMS are given below in pictorial form



18. Explain the features of MySQL software.

Ans. The features of MySQL are as follows

(i) **Speed** MySQL is a very fast and reliable database program that supports clump servers for several demanding application programs. The speed of MySQL has been backed up by a large number of benchmark tests.

(ii) **Open Source** It is an open source database system which means anyone can use it without any cost. One of the most benefit of MySQL includes its wide availability in the market with no ownership cost.MySQL is quite customisable due to the fact that developers can alter its code in order to satisfy their needs.

(iii) **Ease to Use** MySQL is a high performance but relatively simple database system and is less complex to setup or examine than larger database systems.

(iv) **Query Language Support** ANSI (American National Standard Institute) standard SQL is an easy language to use because of its straight forward and simple syntax. MySQL supports standard based SQL (Structured Query Language) for querying and managing relational databases.

(v) **Security** MySQL is secured as all its access passwords are stored in an encrypted format restricting any unauthorised access to the system. It also encrypts the transactions so eavesdroppers and data maintenance tools cannot replicate or regenerate the database transactions once they are processed.

(vi) **Cross Platform Portability** MySQL is easily installable and operable on different platforms including Linux, Windows, OS2, Solaris etc. It also contains APIs for integration with various programming languages like C, C++, PHP, Java, Perl, Python and Ruby etc.

19. Write the different SQL commands with their uses

Ans. There are different types of SQL command as

(i) **Data Definition Language (DDL)** DDL is used to define the structure of your tables and other objects in the database. In DBMS, it is used to specify a database schema as a set of definitions (expressed in DDL), In SQL, DDL allows you to create, alter and destroy database objects.

(ii) **Data Manipulation Language (DML)** DML provides various commands used to access and manipulate data in existing database. This manipulation involves inserting data into database tables, retrieving existing data, deleting data from existing tables and modifying existing data.

(iii) **Transaction Control Language (TCL)** TCL is playing an important role in SQL. TCL commands are used to manage transactions in database. These are also used to manage the changes made by DML statements. It allows statements to be grouped together into logical transactions. A transactions is a single unit of work.

(iv) **Data Control Language (DCL)** DCL commands are used to assign security levels in database which involves multiple user setups.

Basically, the DCL command of the SQL language is used to create privileges to allow users access to and manipulation of the database.

20. Differentiate DDL and DML commands of SQL with examples.

Ans. The differences between DDL and DML commands are

DDL	DML
DDL is the abbreviation of Data Definition Language.	DML is the abbreviation of Data Manipulation Language.
It is used to create and modify the structure of database objects in database.	It is used to retrieve, store, modify, delete, insert and update data in database.
DDL commands allow us to perform tasks related to data definition.	DML commands are used to manipulate data.
For example, CREATE, ALTER and DROP commands.	*For example*, SELECT, UPDATE and INSERT commands.

21. Write SQL commands for the question from (i) to (viii) on the basis of table MASTER (contains details of employees).

Table : MASTER

S.No.	Name	Age	Department	Salary
1	Shyam	21	Computer	12000
2	Shiv	25	Maths	15000
3	Rakesh	31	Hindi	14000
4	Sharmila	32	History	20000
5	Dushyant	25	Software	30000

(i) Write a command to update the salary of the employee to 40000, whose S. No. is 3.

(ii) Write a query to add a column Date_of_Joining to the table MASTER.

(iii) Select Age, Department of those employees whose salary is greater than 12000.

(iv) List all data of table MASTER.

(v) Write a query to change the data type of a column Name to varchar with size 35.

(vi) Write a command to delete the table MASTER those employees whose name is Rakesh.

(vii) Write a command to update the department of the employee to english, whose name is Dushyant.

(viii) Write a command to delete the table with the structure.

Ans. (i)
```
mysql>UPDATE MASTER SET Salary
= 40000 WHERE S.No.=3;
```

(ii)
```
mysql>ALTER TABLE MASTER ADD Date_of_Joining
DATE;
```

(iii)
```
mysql>SELECT Age, Department
FROM MASTER WHERE Salary>12000;
```

(iv)
```
mysql>SELECT * FROM MASTER;
```

(v)
```
mysql>ALTER TABLE MASTER MODIFY
 Name VARCHAR (35);
```

(vi)
```
mysql>DELETE FROM MASTER WHERE
Name="Rakesh";
```

(vii)
```
mysql>UPDATE MASTER SET Department
= "English" WHERE Name = "Dushyant";
```

(viii)
```
mysql>DROP TABLE MASTER;
```

22. Consider the following table named "SBOP" with details of account holders. Write commands of MySQL for (i) to (iv).

Table : SBOP

AccountNo	Name	Balance	DateOfOpen	Transactions
SB-1	Mr. Anil	15000.00	2011-02-24	7
SB-2	Mr. Amit	23567.89	NULL	8
SB-3	Mrs. Sakshi	45000.00	2012-02-04	5
SB-4	Mr. Gopal	23812.35	2013-09-22	NULL
SB-5	Mr. Dennis	63459.80	2009-11-10	15

(i) To display AccountNo, Name and DateOfOpen of account holders having transactions more than 8.

(ii) To display all information of account holders whose transaction value is not mentioned.

(iii) To add another column Address with data type and size as Varchar(25).

(iv) To display the month day with reference to DateOfOpen for all the account holders.

Ans. (i)
```
SELECT AccountNo, Name, DateOfOpen
FROM SBOP WHERE Transactions > 8;
```
(ii)
```
SELECT * FROM SBOP
WHERE Transactions IS NULL;
```
(iii)
```
ALTER TABLE SBOP
ADD Address VARCHAR(25);
```
(iv)
```
SELECT DAYOFMONTH(DateOfOpen),
Name FROM SBOP;
```

Chapter Test

Multiple Choice Questions

1. ..... commands work with entire database objects.
(a) DML (b) DDL
(c) TCL (d) DCL

2. The time format used in MySQL is
(a) MM:HH:SS (b) HH:MM:SS
(c) SS:MM:HH (d) None of these

3. Which of the following are not features of MySQL?
(a) Source code cannot be modified.
(b) Free usage for limited period.
(c) Cannot be redistributed.
(d) None of the above

4. What is the maximum number of characters that can be specified for a varchar field?
(a) 10 (b) 200
(c) 100 (d) 255

5. What is the size in bytes of TINYINT data type?
(a) 2 Bytes (b) 1 Byte
(c) 10 Bytes (d) None of these

Short Answer Type Questions

6. Compare the following commands
(i) DROP
(ii) USE

7. Explain the cross platform working feature of MySQL.

8. A table "T1" comprises of 10 columns and 15 rows .
3 more columns and 2 rows are added. What will be the degree and cardinality of the table now?

9. Manoj wants to create tables to store his transaction details with following columns

Table : Transaction
Tran_ID
Tran_Date
Qty
Rate
Amount
Prod_ID

Table : Product
Prod_ID
Prodname
Price

To make these tables, he got confused in some questons. Help him to clarify these issues.
(i) Identify the primary key of Transaction table.
(ii) Identify the foreign key of Transaction table.

10. Given a table "HouseBuilding" carrying following columns

BuildingID	BName	Registration_No	Locality	PinNo	HoldingNo	Phone	E-mail

(i) Identify the columns that can be candidate keys.
(ii) If BuildingID is selected as primary key, which columns will be alternate keys ?

Long Answer Type Questions

11. Write commands as specified
Neeraj wants to create a database "Library" and create a table " Book" in it.
The columns in the table would be as follows. A sample data is also given

BookID	Bookname	Type	Price	Pub
B01	Astronomy	Science	2000.50	PHI

Write the set of SQL commands for the above.

12. Given two tables Student and Hostel

Table : Student

RollNo	Name	Class	HostelID
1	Sumita	11	H1
2	Anil	12	H2
3	Srinjal	8	H1
4	Laxmi	9	H3

Table : Hostel

HostelID	HostelName	Location
H1	Ganga	Delhi
H2	Yamuna	Mumbai
H3	Saraswati	Kolkata

(i) Identify the primary keys of both the tables.
(ii) Identify the foreign key of Student table.
(iii) What is the hostel name of Srinjal?

13. Differentiate primary key and foreign key.

14. Write the following features
(i) Security (ii) Query language support
(iii) Connectivity

Answers

Multiple Choice Questions

1. *(b)* ***2.*** *(b)* ***3.*** *(d)* ***4.*** *(d)* ***5.*** *(b)*